

The opinion in support of the decision being entered today was **not** written for publication and is **not** binding precedent of the Board.

Paper No. 11

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte
CHARLES R. CARRIGAN,
and JOHN J. NITAO

Appeal No. 2000-1091
Application No. 08/874,167

ON BRIEF

Before LIEBERMAN, KRATZ and DELMENDO Administrative Patent Judges.

LIEBERMAN, Administrative Patent Judge.

DECISION ON APPEAL

This is an appeal under 35 U.S.C. § 134 from the decision of the examiner refusing to allow claims 1, 2, 4 through 20 and 22 through 24. Claims 3 and 21 have been allowed.

THE INVENTION

The invention is directed to a process for removing contaminants from a low-permeability soil. Two independent processes are combined to prevent dry out of soil. The first is electro-osmosis. The second is joule or ohmic heating. Additional limitations are described in the following illustrative claims.

THE CLAIMS

Claims 1 and 15 are illustrative of appellants' invention and are reproduced below.

1. A process for removing contaminants from low-permeability soil, comprising:
combining electro-osmosis and joule heating to prevent dry out of soil adjacent to
joule heating electrodes.
15. A hybrid joule heating/electro-osmosis process for extracting water-soluble
contaminants and non-aqueous phase liquids from saturated, contaminated, low-
permeability soil formations, comprising:

providing partial desaturation of the formation using electro-osmosis to remove a
portion of the pore fluid of the formation by induction of a ground water flow to
extraction wells,

performing joule heating on a partially desaturated formation causing transfer or
partitioning of liquid state contaminants to the vapor phase and increasing the vapor
phase pressure in the formation such that the contaminant laden vapor phase is
forced out into soil of higher permeability where such can be captured.

THE REFERENCES OF RECORD

As evidence of obviousness, the examiner relies upon the following references:

Pool

5,433,829

Jul. 18, 1995

Carrigan et al (Carrigan), "A fully Coupled Model for 3-d partially saturated flow and transport in Soil Ohmically heated by application of multiphase AC electrical potentials." (April 1995).

THE REJECTION

Claims 1, 2, 4 through 20 and 22 through 24 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Pool in view of Carrigan.

OPINION

We have carefully considered all of the arguments advanced by the appellants and the examiner and agree with the examiner that the rejection of the claims is well founded. Accordingly, we affirm this rejection.

The Rejection Under § 103(a)

As an initial matter appellants argue claims 2, 12, 15 and 20 separately from claim 1. See Brief, page 7. Accordingly, we consider independent claims 1 and 15 and dependent claims 2, 12, and 20. See 37 CFR § 1.192 (c)(7)(1998). As to the balance of the claims, no other claims have been grouped separately; accordingly, they stand or fall together with the respective aforementioned independent claims.

The Rejection Over Pool in View of Carrigan

It is the appellants' position that, "[t]he examiner incorrectly contends that Pool teaches 'electro-osmosis and heating of the soil by a DC with AC superimposed thereon.'" See Brief, page 7. We disagree.

Pool is directed to the electroreclamation of soil material. See column 1, lines 9-10. To that effect Pool teaches "bringing a plurality of electrodes into current-conducting connection with the soil material to be reclaimed; bringing a portion of the electrodes into current-conducting connection with the positive or negative pole of a source of DC voltage, bringing the remaining portion of the electrodes into contact with the other pole of said source of DC voltage, thereby forming one or more anodes and one or more cathodes and passing an electric current through the soil material to be reclaimed between the differently charged electrodes." See column 1, lines 10-20.

We find that Pool's process is directed to bringing polluted ground material, for example, earth polluted with heavy metals back to its original state. See column 2, lines 7-9, and 48-50. We find that although the disclosed process contains only one example, Pool states that, "the parameters of the conditioning process of soil material according to the invention, for example, the voltage to be maintained between the anode(s) and cathode(s), the composition of the mediums of the region adjoining the anode(s) and cathode(s), which composition is to be controlled, the duration of the treatment etc., depend upon the nature of the soil being treated (sand, peat, clay etc.), the nature (heavy metals, harmful anions etc.) and degree of pollution thereof, etc. and hence cannot be

predicted, but should be determined for each individual case.” See column 7, lines 28-38. We further find that electro-osmosis was one of the processes occurring during reclamation at the cathode. See, column 7, lines 45-49. Furthermore, we find that there is a specific disclosure of heating of the soil. The statement relating to soil temperature discloses that, “[t]he soil temperature at a depth of 50 cm and 50 cm from the cathode increased to ten degrees centigrade above the normal soil temperature.” See column 7, lines 25-27.

Although, there is no other express teaching of ohmic heating, the examiner relies upon the disclosure in column 3, lines 60-65, that, “[t]he electric current passed between the anode(s) and cathode(s) through the material being cleaned may be a direct current only, but it is also possible to perform the process according to the invention with a directed current with an alternating current superimposed thereon, or with a pulsing direct current.”

The examiner further relies upon the specification as supporting the teachings of Pool by itself teaching that Joule heating is accomplished by passing AC current through the soil, Answer, page 4, citing pages 2 and 6 of the specification, and that the combination of electro osmosis with ohmic heating involves application of DC voltage between an AC heating electrode and a nearby satellite DC electrode, which combination is disclosed by Pool. We conclude therefrom that the process disclosed by Pool falls within the scope of the claimed subject matter.

Furthermore, although the specification discloses that, “[j]oule heating of the

desaturated formation results in transfer or partitioning of liquid state contaminants to the vapor phase[,]” specification, page 8, there is no requirement in the claimed subject matter that the temperature is raised to any given extent. Neither is there a requirement that the contaminants be non-volatile. Indeed, the appellants indicate that the contaminants include accidental spills, and industrial operation, page 1, and gasoline spills. See pages 3 and 4 which include materials which are highly volatile and require little heat to achieve vaporization. Accordingly, we interpret the claimed subject matter including liquid and solid contaminants, volatile and non-volatile liquids and any degree of Joule heating. See In re Morris, 127 F.3d 1048, 1053-54, 44 USPQ2d 1023, 1027 (Fed. Cir. 1997); In re Zletz, 893 F.2d 319, 321, 13 USPQ2d 1320, 1322 (Fed. Cir. 1989); In re Sneed, 710 F.2d 1544, 1548, 218 USPQ 385, 388 (Fed. Cir. 1983); In re Okuzawa, 537 F.2d 545, 548, 190 USPQ 464, 466 (CCPA 1976). During patent prosecution, claims are to be given their broadest reasonable interpretation consistent with the specification, and the claim language is to be read in view of the specification as it would be interpreted by one of ordinary skill in the art.

Carrigan is directed to electrical resistance heating of soil. See page 2. We find that Carrigan discloses multiphase AC utilizing electrode placement. See page 3. We find that Carrigan discloses a module to obtain preliminary estimation of voltage and current demands from a power supply. *Id.* Accordingly, voltage, current and electrode placement can be adjusted.

Based upon the above findings and analysis, we conclude that the teaching by Pool of AC in conjunction with DC necessarily results in some amount of Joule heating as required by the claimed subject matter, particularly as the claims do not require any given amount of joule heating. Furthermore, inasmuch as Pool discloses some increase in the temperature of the soil and recognizes that different conditions can be utilized dependent upon the specific circumstances, we conclude that it would have been obvious to the person having ordinary skill in the art to have adjusted the voltage and current of the AC as disclosed by Carrigan particularly as Pool teaches the combination of AC and DC and variation in voltage. Stated otherwise, although Pool does not disclose the specific conditions utilized when the invention is performed with a direct current with an alternating current superimposed thereon, we conclude that it would have been obvious for the person having ordinary skill in the art to have combined the specific teachings of Carrigan directed to the utilization of alternating current and the resulting joule heating effects in the teachings of Pool.

As to the specific limitation of claims 15 which requires "partial desaturation of the formation using electro-osmosis," Pool discloses that one of the processes ongoing is electro-osmosis which is the movement of ground water and positive ions from the anode to the cathode owing to a different ion potential. See column 12, lines 35-37 and column 7, lines 45-49. This movement of water and ions necessarily results in desaturation of the formation as required by the claimed subject matter.

Finally, as to the specific limitation of claims 2 and 20 which requires the simultaneous occurrence of electro-osmosis and joule heating, inasmuch as Pool discloses a direct current with an alternating current superimposed thereon, it is reasonable to expect that both electro-osmosis and joule heating occurs at the same time as required by claims 2 and 20, particularly as Pool discloses multiple arrangements of electrodes including in the example with 9 groups of anodes connected to a cathode. See column 5, line 63 to column 6, line 14. Superimposing an alternating current on a direct current as suggested by Pool would result in the requisite electro-osmosis and joule heating.

Based upon the above findings and analysis, we conclude that the examiner has established a prima facie case of obviousness with respect to the claimed subject matter.

DECISION

The rejection of claims 1, 2, 4 through 20 and 22 through 24 under 35 U.S.C. § 103(a) as being unpatentable over Pool in view of Carrigan is affirmed.

The decision of the examiner is affirmed.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 CFR § 1.136(a).

AFFIRMED

PAUL LIEBERMAN
Administrative Patent Judge

PETER F. KRATZ
Administrative Patent Judge

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Administrative Patent Judge

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